

# Balearic lime burials. New insights on an old funerary ritual

Guy De Mulder (1), Mark Van Strydonck (2), Mathieu Boudin (3), Damià Ramis (4),  
Laurent Fontaine (5)

(1) Department of Archaeology, Ghent University, Ghent, Belgium

(2-3, 5) Royal Institute for Cultural Heritage, Brussels, Belgium:

(4) Natural History Society of the Balearics, Palma de Mallorca, Balearic Islands, Spain

(1) guy.demulder@ugent.be, (2) marbolleke@telenet.be, (3) Mathieu.boudin@kikirpa.be,

(4) damiaramis@gmail.com, (5) Laurent.fontaine@kikirpa.be

**Abstract.** Quicklime burials are a specific protohistoric ritual of the Balearic Islands. A lot of them have been excavated in the previous century but radiocarbon dating of this specific phenomenon started with the sites of Son Matge and Son Muertos de Gallard in the 1970's. Recent research has shed new light on this burial ritual. Analysis of the bones and lime have proven that the quicklime burials are the result of cremation with the use of crushed rock carbonate, which must have covered the dead body. New excavations on the sites of Cova de Na Dent, Son Pellisser (Mallorca) and Cova de Sa Prior (Menorca) has delivered new insights in the chronology of this ritual. The conclusion drawn from the  $^{14}\text{C}$  measurements is that the ritual dates back to the beginning of the Early Iron Age and survives until the beginning of the Roman Imperial period, as proven by a typochronological study of the pottery.

## Enterramientos de cal Baleares. Nuevas percepciones sobre un viejo ritual funerario

**Resumen.** Los entierros de cal viva son un ritual protohistórico específico de las Islas Baleares. Muchos de ellos han sido excavados en el siglo pasado, pero la datación por radiocarbono de este fenómeno específico comenzó con los yacimientos de Son Matge y Son Muertos de Gallard en los años setenta. Investigaciones recientes han arrojado nueva luz sobre este ritual funerario. El análisis de los huesos y la cal ha demostrado que los entierros de cal viva son el resultado de la cremación con carbonato de roca triturada, que debe haber cubierto el cadáver. Nuevas excavaciones en los yacimientos de Cova de Na Dent, Son Pellisser (Mallorca) y Cova de Sa Prior (Menorca) han aportado nuevos conocimientos sobre la cronología de este ritual. La conclusión extraída de las mediciones  $^{14}\text{C}$  es que el ritual se remonta al principio de la Edad del Hierro Temprana y perdura hasta el principio del período imperial romano, como lo demuestra un estudio tipocronológico de la cerámica.

## 1 Introduction

Quicklime burials are a specific protohistoric ritual of the Balearic Islands (Menorca and Mallorca). In the previous century, a lot of them have been excavated. In the early period, research was focused on the collection of the rich deposition of funerary offerings, which were collected by the excavators. The quality of the description of the specific characteristics of these burials was not up to scientific standards, also because the excavators did not understand the specific characteristics of this extraordinary ritual. The dating of these burials was based on the typochronological studies of the recovered artefacts.

## 2 Overview of the history of limeburials and radiocarbon dating

The earliest recorded excavations go back to the 19<sup>th</sup> century with early discoveries at Son Taixaquet (1840) and Son Cresta (1895) both located in the community of Llucmajor [En81]. In the previous century, archaeological interest in the research of these burial caves increased, focusing on the discovery of the deposited funerary objects (see for an overview En81). The chronology of this specific burial ritual was based on a typochronological study of the recorded finds in these



caves and rock shelters. At the end of the century, the first radiocarbon dating started with the sites of Son Matge (Fig. 1), Son Muertos Gallard and Cova de son Puig in the 1970's [Wal82a, Wal82b, Mi05].

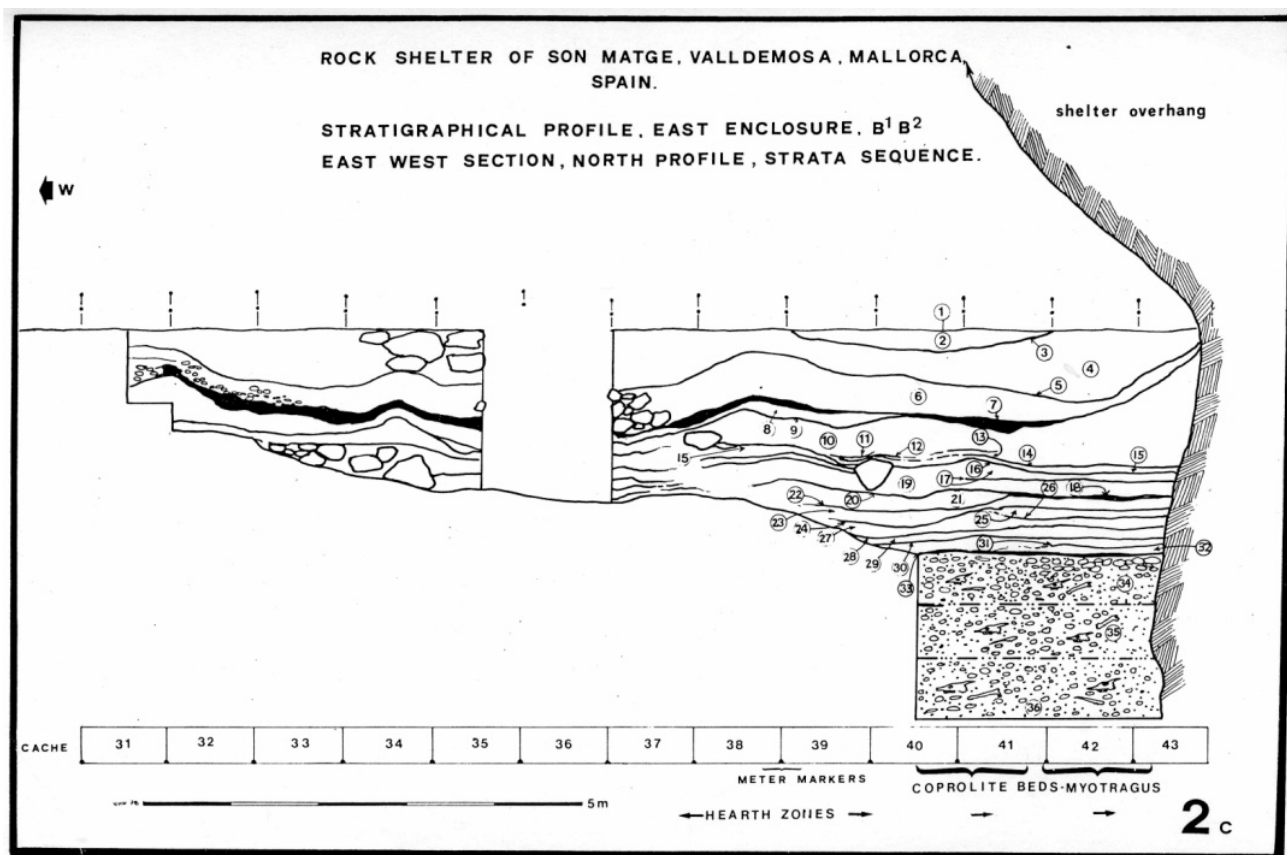


Figure 1 - Son Matge: layer 7 is the black layer with burned bones, 6 layer represents the lime burial (after Waldren 1982).

The interpretation of the ritual by former archaeologists was complicated due to the presence of older features, but sometimes also inhumation remains in the lime burial, as for example at the sites of Son Bosc near Andratx [En81] Son Maimó at Petra [Ve77] and Son Bauza near Palma [Dol75]. According to some excavators, this specific ritual had to be interpreted as an inhumation ritual in caves and rock shelters with the use of quicklime to decompose the bodies. The use of quicklime was responsible for the burned appearance of the bones due to a specific chemical reaction [Wal95].

### 3. New ideas on lime burials

Recent research has shed new light on this burial ritual. Analysis of the bones and lime (petrographic analysis, XRF, FTIR) and laboratory tests have proven that the quicklime burials are the results of cremation with the use of crushed rock carbonate, which must have covered the dead body (Fig. 2). This is reflected in the radiocarbon age of the cremated bones. During cremation, there is an exchange of the carbon between the bioapatite of the bone of the body on the one hand and the atmosphere, the fuel and the crushed limestone on the other hand. Due to this the cremated bones take up infinite old carbon from the limestone and therefore have an apparent age that can be even older than the first human occupation of the Islands [Stry15a, Stry15b]. Furthermore, recent studies have demonstrated that the lowest level of almost all lime burials consists of badly cremated bones (black instead of white) and soil but without lime. Traditionally this level was considered to be from another period, but it has become clear that it is the onset of the lime burial [Stry in print].



Figure 2 - Fragment of a limeburial with the lime and cremated bone.

Independent research by E. Schotsmans confirmed the results of the test with the quicklime and bones in the radiocarbon laboratory in Brussels (Fig. 3). E. Schotsmans had tested the impact on the bones of inhumated bodies by quicklime in the context of forensic anthropological research [Scho11, Sch14].

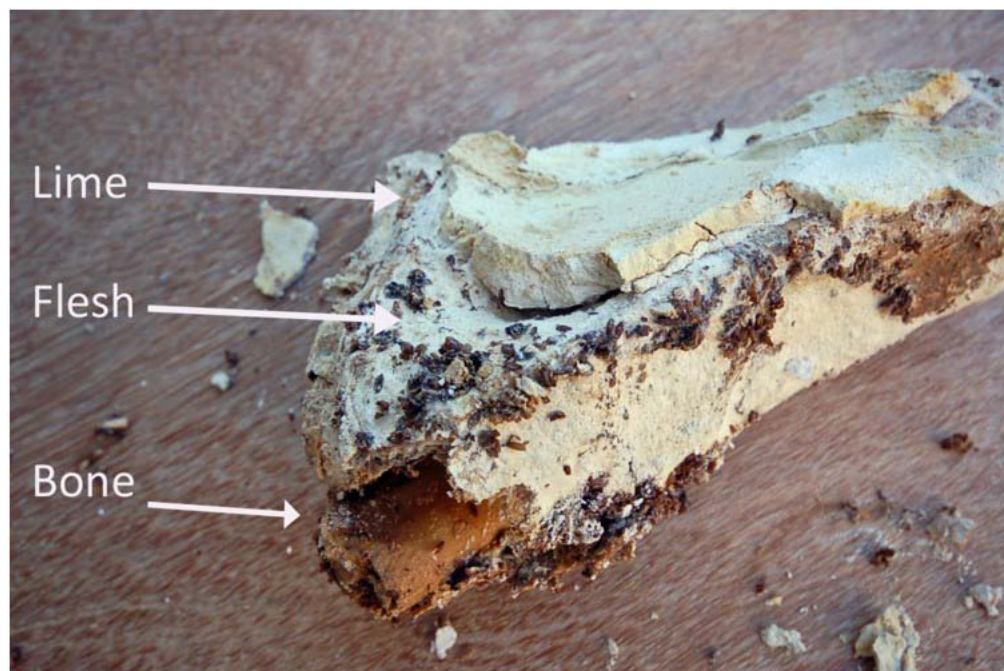
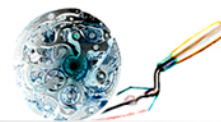


Figure 3 - The appearance of a bone, which had been buried under quicklime for 18 months. Test in the Radiocarbon Laboratory, Brussels.





#### 4. Cova de Na Dent (S'Estanyd'en Mas, Mallorca)

The site of Cova de Na Dent (39°30'54.33"N, 3°18'19.92"E) was sampled in 2012. The lime burial was located in a rock shelter. Illegal digging had destroyed parts of it, but at one side, the lime burial was still intact. This feature was about 45-50 cm thick. Between the red soil and the lime burial was a small black layer, containing black, burned bones (Fig. 4).

In spite of several attempts to date the lime with the radiocarbon technique, the results remained unreliable. This is because the cave is situated in an area of ancient reef formation. The titration method is not capable to separate the soft fossil reef carbonate from the anthropogenic lime. In the case of lime burials situated in the Tramuntana region, the method is suitable for this type of analysis [Dem14, Stry15].

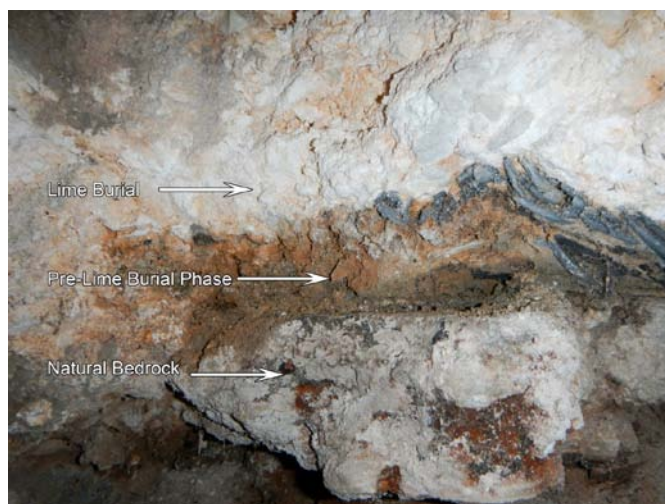


Figure 4 - Section through the limeburial at Cova de Na Dent. The different layers are recognizable.

Former dates realised on lime samples from the site have to be questioned about their reliability due to contamination problems. Nevertheless two black bones from the lowest (limeless layer) could be dated 750-400BC. A more precise date was imposable due to the Hallstatt plateau (Fig. 5).

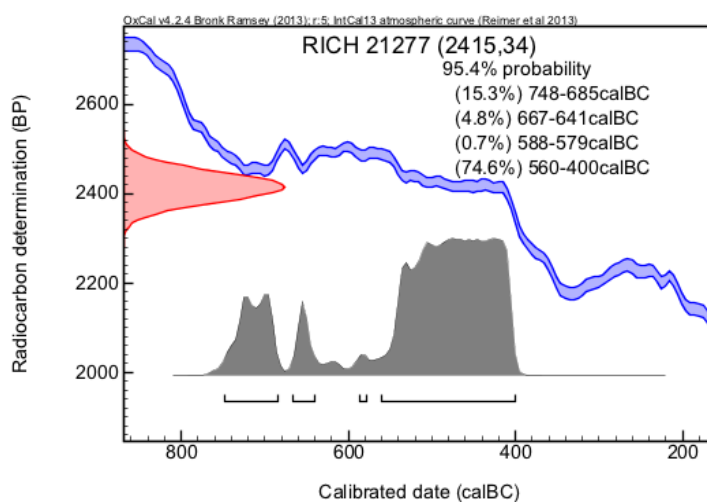


Figure 5 - The radiocarbon result on a black burned bone from Cova de Na Dent



## 5. Son Pellisser, (Calvia, Mallorca)

The cave of Son Pellisser is located high in the mountains of Na Burguesa (39°32'47.28"N, 2°31'50.14"E). The cave existed of four rooms, but only two of these contained archaeological remains. In room 1, a lime burial was discovered. Originally, it had been a rock shelter used as a necropolis. In a later period, the front part collapsed and closed the entrance almost completely off. J. Aramburu, A. Fernandez and Mercedes Alvarez directed the excavations.

Under the lime burial there was a succession of small layers, which were typical for the seasonal stabling of livestock. These were dated to the end of the third millennium [Ar15a]. On top of this layer, rich in charcoal, two different lime burial levels were found (UE15 and UE14) (Fig. 6). Both lime levels had a maximum thickness of about ca. 60cm. A layer of stone slabs and blocks covered the first lime layer when part of the cave's roof collapsed and covered the lower part of the lime burial. On top of the second lime layer, large stone blocks, coming from the collapse of the front of the rock shelter, sealed off the site. Within the lime burial, next to the cremated bones, the existence of inhumations was also ascertained [Ar15b].

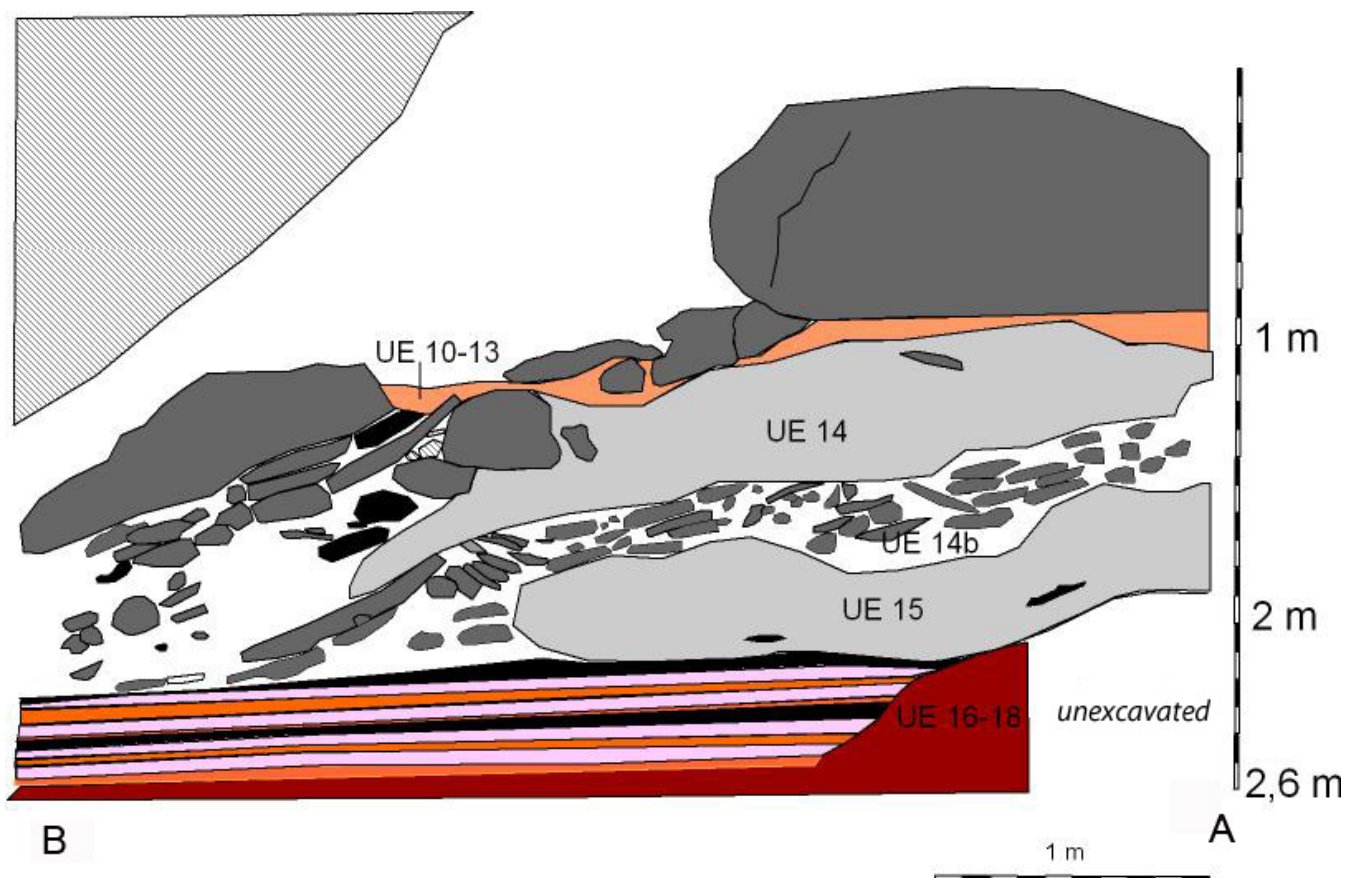


Figure 6 - The stratigraphy of room 1 at Son Pellisser.

Since the lime burial was situated in the fouldmountains of the Tramuntana range, the lime was suitable for dating. This was not the only fact that facilitated the dating research. The lime burial was divided in two layers separated by a collapse layer. At a certain point in time part of the cave's roof felt down. This situation was very advantageous for the dating of the deposits. Lime burials give poor stratigraphical information because the lime is not deposited in layers, but in packages and holes in the lime layers can be filled up with later depositions. The collapse layer however makes a very sharp division of the lime burial in a lower/older and upper/younger part. This collapse could be dated rather sharply around 410 BC, just after the Hallstatt plateau [Stry17]. The dating of a human bone found right under the lime burial and a piece of charcoal found in the lowest layers without lime places the boundary of the onset around 780 BC. Some caution is however needed. The deposition prior to the lime burial is before the Hallstatt plateau but the oldest date of the layer without lime is already at the start of the plateau. So an accurate date cannot be put forward. The youngest radiocarbon dates puts the end of the lime burial in the late Iron Age or in the early Roman period (Fig. 7).

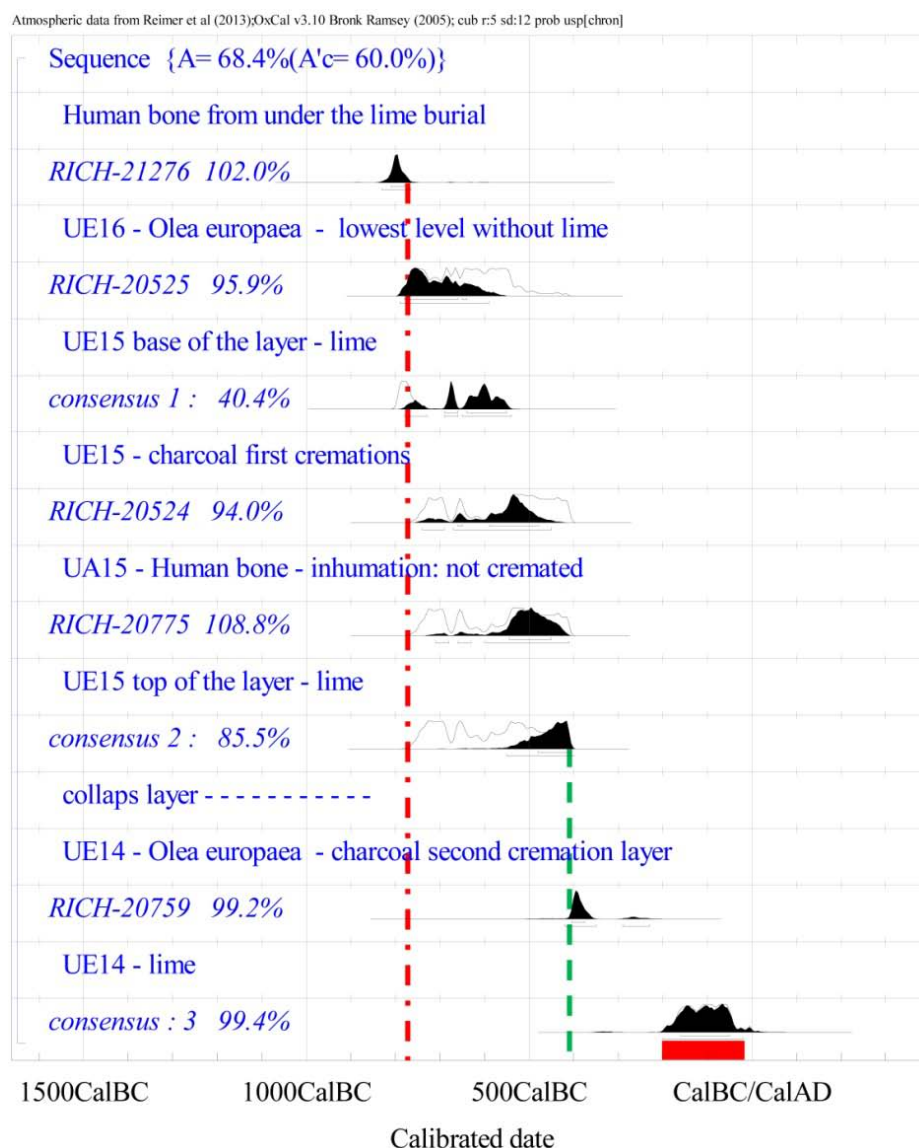


Figure 7 - Bayesian analysis of the lime burial data at Son Pellisser.

## 6 Covade Sa Prior (Binigaus, Menorca)

The site of Cova de Sa Prior is situated in the barranc (canyon) of Binigaus (EsMigjorn Gran) (39°56.023' N, 4°02.281' E). The entrance to the cave is located in the upper part of the cliff. Its entrance orientated to the East. Fieldwork took place in the autumn of 2015. Although previous prospection had shown that illegal excavations had disturbed the site, some parts of the lime burial seemed to be preserved. However, the excavation proved that the illegal digging had done more damage to the site than expected [Stry in print].

Radiocarbon dating was only possible on black bones from the lower level (Fig. 8). First, because clandestine excavations heavily disturbed the lime layers, but second also because the lime burial is once again situated in an ancient reef formation. Geological survey in the area around the cave has demonstrated that the limestone used in the funerary rite at the Cova de Sa Prior was of local origin [Fon17]. Most results on the black carbon of these bones fell in the so-called Hallstatt plateau. However, the oldest black bone is dated around 800 BC, just before the Hallstatt period (Fig. 9).



Figure 8 - Fragment of the layer with black bones, pictured upside down. The difference between the black bones and the lime layer is clearly visible.

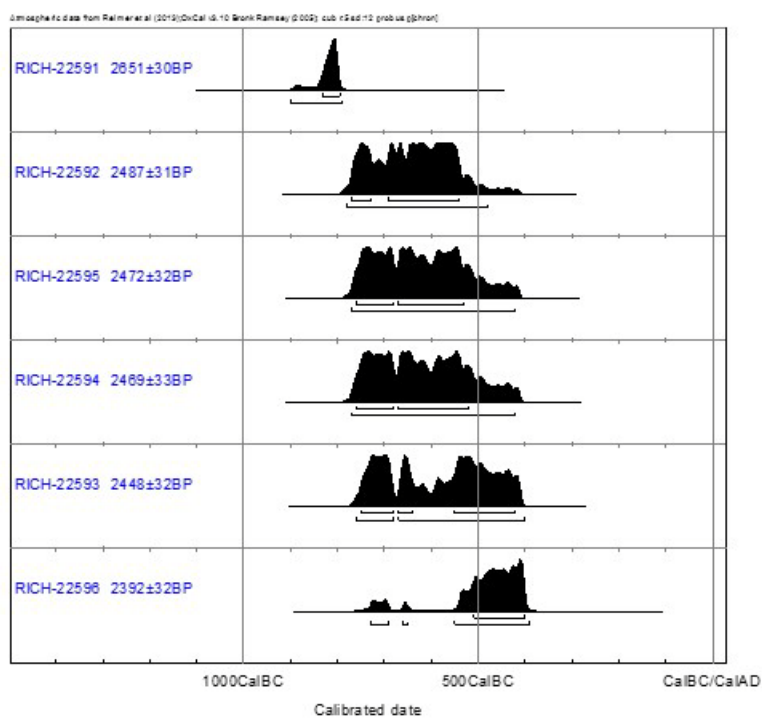


Figure 9 - Radiocarbon results on the black bones from Son Pellisser.





## 7 Conclusions

Traditionally, lime burials were dated by use of the typochronology of the deposited artefacts in the caves and rock shelters. The first radiocarbon dates for these sites go back to the 70's of the previous century. New radiocarbon dates were realized on samples from the recently excavated sites. These samples were critically selected taking into account any possible contamination. Therefore, it is important to select the suitable material taking into account the quality, the depositional context and the regional geology.

The radiocarbon analyses have demonstrated that the lime burial practice dates back to the first Iron Age. The lowest level of the lime burial, the level with black and badly cremated bones without lime, can be situated around or just after 800BC. When the transition from this first incineration layer to the real lime burial took place is for the moment difficult to establish, but must have been before the end of the Hallstatt plateau, certainly before 400 BC, but most probably even before 550-600BC. This contrast with the proposed lower chronology, which based on the deposition of the funerary artefacts, suggested a start in the fifth century BC (Mi05: Mi06). The end of this specific Balearic ritual happened around the beginning of the Roman Imperial period, as has been proven by the deposition of Roman funerary objects in the caves dating to this period [Dem07]. Further research is needed for the fine-tuning of this chronology, especially the start of the use of lime in the ritual.

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